

§ 572.181, Nt.

(b) Exterior dimensions of ES-2re test dummy are shown in drawing 175-0000 sheet 3 of 6, dated February 2008.

(c) Weights of body segments (head, neck, upper and lower torso, arms and upper and lower segments) and the center of gravity location of the head are shown in drawing 175-0000 sheet 2 of 6, dated February 2008.

(d) Adjacent segments are joined in a manner such that, except for contacts existing under static conditions, there is no additional contact between metallic elements of adjacent body segments throughout the range of motion.

(e) The structural properties of the dummy are such that the dummy conforms to this Subpart in every respect before use in any test similar to those in Standard No. 214, Side Impact Protection and Standard No. 201, Occupant Protection in Interior Impact.

[71 FR 75331, Dec. 14, 2006, as amended at 73 FR 33921, June 16, 2008]

EFFECTIVE DATE NOTE: At 76 FR 31866, June 2, 2011, § 572.181 was amended revising paragraphs (a), (b), and (c), effective Nov. 29, 2011. For the convenience of the user, the added and revised text is set forth as follows:

§ 572.181 General description.

(a) The ES-2re Side Impact Crash Test Dummy, 50th Percentile Adult Male, is defined by:

(1) The drawings and specifications contained in the "Parts List and Drawings, Part 572 Subpart U, Eurosid 2 with Rib Extensions (ES-2re, Alpha Version), September 2009," (incorporated by reference, see § 572.180), which includes the technical drawings and specifications described in Drawing 175-0000, the titles of which are listed in Table A;

TABLE A

Component assembly	Drawing No.
Head Assembly	175-1000
Neck Assembly Test/Cert	175-2000
Neck Bracket Including Lifting Eyebolt	175-2500
Shoulder Assembly	175-3000
Arm Assembly-Left	175-3500
Arm Assembly-Right	175-3800
Thorax Assembly with Rib Extensions	175-4000
Abdominal Assembly	175-5000
Lumbar Spine Assembly	175-5500
Pelvis Assembly	175-6000
Leg Assembly, Left	175-7000-1
Leg Assembly, Right	175-7000-2
Neoprene Body Suit	175-8000

(2) "Parts/Drawings List, Part 572 Subpart U, Eurosid 2 with Rib Extensions (ES2re), September 2009," containing 9 pages, incorporated by reference, see § 572.180,

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(3) A listing of available transducers-crash test sensors for the ES-2re Crash Test Dummy is shown in drawing 175-0000 sheet 4 of 6, dated February 2008, incorporated by reference, see § 572.180.

(4) Procedures for Assembly, Disassembly and Inspection (PADI) of the ES-2re Side Impact Crash Test Dummy, February 2008, incorporated by reference, see § 572.180.

(5) Sign convention for signal outputs reference document SAE J1733 Information Report, titled "Sign Convention for Vehicle Crash Testing" dated December 1994, incorporated by reference, see § 572.180.

(b) Exterior dimensions of ES-2re test dummy are shown in drawing 175-0000 sheet 3 of 6, dated February 2008, incorporated by reference, see § 572.180.

(c) Weights of body segments (head, neck, upper and lower torso, arms and upper and lower segments) and the center of gravity location of the head are shown in drawing 175-0000 sheet 2 of 6, dated February 2008, incorporated by reference, see § 572.180.

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§ 572.182 Head assembly.

(a) The head assembly consists of the head (drawing 175-1000), including the neck upper transducer structural replacement, and a set of three (3) accelerometers in conformance with specifications in § 572.189(b) and mounted as shown in drawing (175-0000 sheet 1 of 6). When tested to the test procedure specified in paragraph (b) of this section, the head assembly shall meet performance requirements specified in paragraph (c) of this section.

(b) *Test procedure.* The head shall be tested per procedure specified in 49 CFR § 572.112(a).

(c) *Performance criteria.* (1) When the head assembly is dropped in accordance with § 572.112 (a), the measured peak resultant acceleration shall be between 125 g's and 155 g's;

(2) The resultant acceleration-time curve shall be unimodal to the extent that oscillations occurring after the main acceleration pulse shall not exceed 15% (zero to peak) of the main pulse;

(3) The fore-and-aft component of the head acceleration shall not exceed 15 g's.

§ 572.183 Neck assembly.

(a) The neck assembly consists of parts shown in drawing 175-2000. For purposes of this test, the neck is

mounted within the headform assembly 175-9000 as shown in Figure U1 in appendix A to this subpart. When subjected to tests procedures specified in paragraph (b) of this section, the neck-headform assembly shall meet performance requirements specified in paragraph (c) of this section.

(b) *Test procedure.* (1) Soak the neck-headform assembly in a test environment as specified in §572.189(n);

(2) Attach the neck-headform assembly to the part 572 subpart E pendulum test fixture as shown in Figure U2-A in appendix A to this subpart, so that the midsagittal plane of the neck-headform assembly is vertical and perpendicular to the plane of motion of the pendulum longitudinal centerline shown in Figure U2-A. Torque the half-spherical screws (175-2004) located at either end of the neck assembly to 88 ±5 in-lbs using the neck compression tool (175-9500) or equivalent;

(3) Release the pendulum from a height sufficient to allow it to fall freely to achieve an impact velocity of 3.4±0.1 m/s measured at the center of the pendulum accelerometer (Figure 22 as set forth in 49 CFR 572.33) at the time the pendulum makes contact with the decelerating mechanism. The velocity-time history of the pendulum falls inside the corridor determined by the upper and lower boundaries specified in Table 1 to paragraph (a) of this section.

(4) Allow the neck to flex without the neck-headform assembly making contact with any object;

(5) Time zero is defined in §572.189(j).

TABLE 1 TO PARAGRAPH (A)—ES-2RE NECK CERTIFICATION PENDULUM VELOCITY CORRIDOR

Upper boundary		Lower boundary	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.25	2.5	-0.375
14.0	-3.20	13.5	-3.7
		17.0	-3.7

(c) *Performance criteria.* (1) The pendulum deceleration pulse is to be characterized in terms of decrease in velocity as determined by integrating the filtered pendulum acceleration response from time-zero.

(2) The maximum rotation in the lateral direction of the reference plane of the headform (175-9000) as shown in Figure U2-B in appendix A to this subpart, shall be 49 to 59 degrees with respect to the longitudinal axis of the pendulum occurring between 54 and 66 ms from time zero. Rotation of the headform-neck assembly and the neck angle with respect to the pendulum shall be measured with potentiometers specified in §572.189(c), installed as shown in drawing 175-9000, and calculated per procedure specified in Figure U2-B in appendix A to this subpart;

(3) The decaying headform rotation vs. time curve shall cross the zero angle with respect to its initial position at time of impact relative to the pendulum centerline between 53 ms to 88 ms after the time the peak translation-rotation value is reached.

[71 FR 75331, Dec. 14, 2006, as amended at 73 FR 33921, June 16, 2008]

§572.184 Shoulder assembly.

(a) The shoulder (175-3000) is part of the body assembly shown in drawing 175-0000. When subjected to impact tests specified in paragraph (b) of this section, the shoulder assembly shall meet performance requirements of paragraph (c) of this section.

(b) *Test procedure.* (1) Soak the dummy assembly, without suit and shoulder foam pad (175-3010), in a test environment as specified in §572.189(n);

(2) The dummy is seated, as shown in Figure U3 in appendix A to this subpart, on a flat, horizontal, rigid surface covered by two overlaid 2 mm thick Teflon sheets and with no back support of the dummy's torso. The dummy's torso spine backplate is vertical within ±2 degrees and the midsagittal plane of the thorax is positioned perpendicular to the direction of the plane of motion of the impactor at contact with the shoulder. The arms are oriented forward at 50±2 degrees from the horizontal, pointing downward. The dummy's legs are horizontal and symmetrical about the midsagittal plane with the distance between the innermost point on the opposite ankle at 100 ±5 mm. The length of the elastic shoulder cord (175-3015) shall be adjusted so that a force between and including 27.5 and 32.5 N applied in a forward direction at